

# First-order linkage analysis (Frequently Applied Designs)

---

**AUTHOR**

Laia Castro Herrero, Theresa Gessler, Silvia Majo-Vazquez

---

**KEYWORDS**

*first-order linkage analyses, content analysis, content data, survey data, mixed method, media effects, public opinion, panel data, experiments*

---

**BRIEF DESCRIPTION**

First-order linkage analyses (Schulz, 2008) employ individual survey data weighted by aggregated content data and are generally used to investigate media effects on public opinion. In contrast to experiments, their outcomes are highly generalizable since they allow to grasp what kind of content people encounter in a naturalistic setting (Barabas & Jerit, 2009), with which frequency and intensity, and how it triggers a particular reaction, attitude change, knowledge gain or behavior. First-order linkage analyses often employ manual and automated content analysis, descriptive and inferential statistical analyses. When using panel data, they are furthermore able to identify within-individual changes in attitudes and behaviors (e.g. Takens et al., 2015).

---

**FIELD OF APPLICATION/THEORETICAL FOUNDATION**

Linkage analyses have extensively been used in the fields of political communication and public opinion, EU studies and media and political psychology. Studies that employed first-order linkage analyses are concerned with theories of agenda setting (Erbring et al., 1980), visibility, priming and media attention on public opinion dynamics (e.g. Bos et al., 2011); news media tone (Hopmann et al., 2010), or the impact of exposure to counter-attitudinal views through the media (Matthes, 2012) on voting decisiveness and

behavior. Framing studies or studies focusing on journalistic styles have also made extant use of linkage analysis (e.g. Jebril et al., 2013; Schuck et al., 2014) (see chapter Content Analysis in Mixed Method approaches for a detailed account of uses, applications and advantages of using linkage analyses).

---

**EXAMPLE STUDIES**

In this data entry we describe three studies that use linkage analyses to estimate (political) media effects. The first study combine survey data on people's news use with content-analyzed news stories they frequently follow to determine the impact of news tone on people's perceptions of the economy (Boomgaarden et al., 2011). The second study present more sophisticated measures of news media exposure weighted by particular content features (in casu, news tone) and also by publication recency and prominence of such content features in news stories (De Vreese et al., 2017). The third study puts forth a linkage analysis strategy using a refined media exposure measure that account for individuals' ideological distance to their frequent media diets in different polities (Castro Herrero & Hopmann, 2017; Castro et al., 2018).

---

**REFERENCES**

- Barabas, J., & Jerit, J. (2009). Estimating the Causal Effects of Media Coverage on Policy-Specific Knowledge. *American Journal of Political Science*, 53(1), 73–89. <https://doi.org/10.1111/j.1540-5907.2008.00358.x>
- Boomgaarden, H. G., Van Spanje, J., Vliegenthart, R., & De Vreese, C. H. (2011). Covering the crisis: Media coverage of the economic crisis and citizens' economic expectations. *Acta Politica*, 46(4), 353–379.



<https://doi.org/10.34778/1j>

© 2021, the authors. This work is licensed under the "Creative Commons Attribution – NonCommercial – NoDerivatives 4.0 International" license (CC BY-NC-ND 4.0)

- Bos, L., Van der Brug, W., & De Vreese, C. (2011). How the media shape perceptions of right-wing populist leaders. *Political Communication*, 28(2), 182–206.
- Castro Herrero, L., & Hopmann, D. N. (2017). The Virtue of Moderation: A Cross-National Analysis of Exposure to Cross-Cutting Information and Turnout. *International Journal of Public Opinion Research*.
- Castro, L., Nir, L., & Skovsgaard, M. (2018). Bridging Gaps in Cross-Cutting Media Exposure: The Role of Public Service Broadcasting. *Political Communication*, 1–24.
- De Vreese, C. H., Boukes, M., Schuck, A., Vliegthart, R., Bos, L., & Lelkes, Y. (2017). Linking survey and media content data: Opportunities, considerations, and pitfalls. *Communication Methods and Measures*, 11(4), 221–244.
- Erbring, L., Goldenberg, E. N., & Miller, A. H. (1980). Front-page news and real-world cues: A new look at agenda-setting by the media. *American Journal of Political Science*, 16–49.
- Hopmann, D. N., Vliegthart, R., De Vreese, C., & Albaek, E. (2010). Effects of election news coverage: How visibility and tone influence party choice. *Political Communication*, 27(4), 389–405.
- Jebril, N., Albaek, E., & De Vreese, C. H. (2013). Infotainment, cynicism and democracy: The effects of privatization vs personalization in the news. *European Journal of Communication*, 28(2), 105–121.
- Matthes, J. (2012). Exposure to counterattitudinal news coverage and the timing of voting decisions. *Communication Research*, 39(2), 147–169.
- Schuck, A. R., Vliegthart, R., & De Vreese, C. H. (2014). Who's Afraid of Conflict? The Mobilizing Effect of Conflict Framing in Campaign News. *British Journal of Political Science*, 1–18.
- Schulz, W. (2008). Content analyses and public opinion research. *The SAGE Handbook of Public Opinion Research*, 348–357.
- Takens, J., Kleinnijenhuis, J., Van Hoof, A., & Van Atteveldt, W. (2015). Party leaders in the media and voting behavior: Priming rather than learning or projection. *Political Communication*, 32(2), 249–267.
- Vreese, C. H. D., & Semetko, H. A. (2004). News matters: Influences on the vote in the Danish 2000 euro referendum campaign. *European Journal of Political Research*, 43(5), 699–722. <https://doi.org/10.1111/j.0304-4130.2004.00171.x>

**Table 1.** Data matching in correlation linkage analyses

Author(s)	Relationship of theoretical interest	Sample	Time frame	Content-analytical constructs	Linkage strategy
Boomgaarden et al., 2011	How exposure to media coverage of the 2008–2009 economic crisis affected expectations regarding the future development of the national economic situation	(a) Predictions or expectations about the economic situations provided by articles of nine newspapers and items from 2 news bulletins in the Netherlands in the period between wave 1 and wave 2 of the survey below-mentioned. For w2 to w3, only the front	Nov 2008–Feb 2009	“Expectation, assumption or prediction of the personal economic situation of the Dutch people/ the Dutch economy” and whether these are negative, neutral or positive	(1) Calculation of number of positive and negative economic expectations/assumptions/predictions per outlet (negative (-2), rather negative (-1), balanced (0), rather positive (1), positive (2)) for either the Dutch economy or the Dutch people. Negative evaluations are weighted twice since people tend to select negative information in greater numbers.

Author(s)	Relationship of theoretical interest	Sample	Time frame	Content-analytical constructs	Linkage strategy
		pages of newspapers were coded. (b) 976 respondents of a three-wave panel survey conducted in the Netherlands between November 2008 to February 2009		(Boomgaarden et al., 2011, p. 361)	(2) Each survey respondent's frequency of use of each outlet is weighted (multiplied) by each outlet's aggregated score for each relevant content characteristic outlined above, and regressed on people's actual economic expectations for the country and for themselves.
De Vreese et al. 2017	How exposure to economic news (visibility and tone) predicts respondents' expectations about the state of the national economy in the coming 12 months	(a) 1,211 hand-coded articles evaluating the state of the Dutch economy in Dutch national newspapers  (b) Three-wave panel data from a surveyed representative sample of the Dutch population	Feb-June 2015	(Negative, neutral or positive) tone towards the Dutch economy	(1) The authors construct a variable in a content-analysed dataset measuring a tone scale per news article, ranging from -2 (completely negative) to 2 (completely positive)  (2) Publication recency for each article (how close in time the article was published to when respondents were surveyed) and prominence of each article (operationalized as how long the article was compared to average article length) were used to create weighted measures, in order to test whether more recent and more lengthy evaluative articles had stronger effects on economic perceptions, as compared to an unweighted variable.  (3) Observations at the article level were then aggregated at the wave-outlet level in a new dataset containing information on total number of articles with evaluations of the economy, tone, and the two weighted measures above-mentioned per outlet in each wave.

Author(s)	Relationship of theoretical interest	Sample	Time frame	Content-analytical constructs	Linkage strategy
-----------	--------------------------------------	--------	------------	-------------------------------	------------------

(4) The linkage was done using the survey dataset. For each individual  $i$  in wave  $w$  a score of the amount of evaluative news (visibility), the positive, neutral or negative connotation of such news (tone) and the weighed variables (weighted tone by recency and prominence) was calculated for each newspaper they read on a weekly basis. The final computation can be illustrated as follows:

For each individual  $i$  and wave  $w$ ,

$$X_{iw} = \sum_k \delta_{iw}(k) \left( \sum_{j \in N_{kw}} y_j \right)$$

Where  $k$  stands for outlet,  $=1$  if individual  $i$  reads outlet  $k$  and  $0$  otherwise, and  $j$  denotes article and  $N_{kw}$  is the set of articles with evaluative news published by outlet  $k$  in wave  $w$ .  $Y_j$  can denote one of three possibilities:

$$y_j = \begin{cases} t_j \\ t_j \cdot r_j \\ t_j \cdot l_j \end{cases}$$

Above,  $t_j$  captures tone of an article,  $r_j$  captures recency and  $l_j$  is a measure of article length.

(5) A series of OLS regression analyses were finally performed, with respondents' expectations on the economy as dependent variable, exposure to media evaluations of the econo-

Author(s)	Relationship of theoretical interest	Sample	Time frame	Content-analytical constructs	Linkage strategy
					variable, exposure to media evaluations of the economy (tone), the weighted tone variables and lagged dependent variables as predictors.
Castro, Nir & Skovsgaard (2018)	How political interest and public service broadcasting strength impact cross-cutting, or counter-attitudinal media exposure; and whether public service media moderates the effect of political interest on cross-cutting exposure	(a) 48,983 news stories from three newspapers and two TV news bulletins across 27 EU countries, collected by the European Election Media Study during the June 2009 European election campaign (May 14 to June 4 for some countries, up to May 17 to June 7 for others). Among such stories, 3,390 news evaluations on the national government's record were identified and used to build the media content component of a cross-cutting media exposure measure.  (b) Self-reported news media exposure and political interest from 27,079 individuals in 27 EU countries surveyed by the European	May-June 2009	Tone toward the national government (positive (1), balanced/mixed (0), negative (-1))	(1) A variable that accounts for the extent to which an individual approves (1) or disapproves (-1) of the government's performance to date is built. (2) The mean of each national government's positive (1), balanced/mixed (0), or negative (-1) evaluations found in each media outlet's news stories is computed. (3) Cross-cutting exposure is calculated by accounting for the absolute difference between each individual's approval of their government and the average degree for each media outlet this individual uses at least once a week, averaged by the number of news media outlets they follow. (4) Random-intercept regression models, using individual exposure to cross-cutting information as the dependent variable, and political interest, public service broadcasting strength (audience share) and an interaction between both as main independent variables, are run. This allows to account for the hierarchical structure of the data by decomposing individual and country-level variances, and also to explain the relationship between cross-cutting news

Author(s)	Relationship of theoretical interest	Sample	Time frame	Content-analytical constructs	Linkage strategy
		Election Study consortium during the three weeks following the June 2009 European Parliament elections.			media exposure and political interest, considering contextual interactions (i.e., with public service broadcasting strength).  See Appendix B of the paper for the exact formula and a more detailed account of how scores are calculated for each individual and media outlet